



# Hughes 9502 Fixed Satellite Terminal

**User Guide** 

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### Understanding safety alert messages

Safety alert messages call attention to potential safety hazards and tell you how to avoid them. These messages are identified by the signal words DANGER, WARNING, CAUTION, or NOTICE, as illustrated below. To avoid possible property damage, personal injury or in some cases possible death read and comply with all safety alert messages.

Messages d'alerte de sécurité attirent l'attention sur les dangers potentiels et de vous dire comment les éviter. Ces messages sont identifiés par un signal mots DANGER, AVERTISSEMENT, ATTENTION, ou avis, comme illustré cidessous. Pour éviter des dommages matériels, des blessures ou la mort dans certains cas possible de lire et de respecter tous les messages d'alerte de sécurité.

Messages concerning personal injury / Messages concernant des blessures corporelles

The signal words DANGER, WARNING, and CAUTION indicate hazards that could result in personal injury or in some cases death, as explained below. Each of these signal words indicates the severity of the potential hazard.

Le signal de DANGER mots, AVERTISSEMENT et ATTENTION indiquer les dangers qui pourraient entraîner des blessures ou, dans certains cas la mort, comme expliqué cidessous. Chacun de ces mots du signal indique la gravité du danger potentiel.



DANGER indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

DANGER indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.





### **A** WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in serious injury.

AVERTISSEMENT indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, pourrait entraîner des blessures graves.

### **A** CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

ATTENTION indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures ou modérées.

Messages concerning property damage /
Messages concernant des dommages matériels

#### NOTICE

NOTICE is used for messages concerning possible property damage, product damage or malfunction, data loss, or other unwanted results—but *not* personal injury.

AVIS est utilisée pour les messages concernant les dommages matériels, des dommages au produit ou de dysfonctionnement, de perte de données ou d'autres résultats indésirables, mais des blessures non personnelle.





### Safety symbols

The generic safety alert symbol Calls attention to a potential personal injury hazard. It appears next to the DANGER, WARNING, and CAUTION signal words as part of the signal word label. Other symbols may appear next to DANGER, WARNING, or CAUTION to indicate a specific type of hazard (for example, fire or electric shock). If other hazard symbols are used in this document they are identified in this section.

Le symbole générique d'alerte suivant l'attire l'attention sur un danger potentiel de risque de blessures. Il apparaît à côté des mots DANGER, AVERTISSEMENT et ATTENTION dans le cadre de l'affichage d'alerte. D'autres symboles peuvent apparaître à côté de DANGER, AVERTISSEMENT ou ATTENTION pour indiquer un type spécifique de danger (par exemple, un incendie ou un choc électrique). Si d'autres symboles de danger sont utilisés dans ce document, ils sont décrits dans cette section.

#### Additional symbols / Symboles supplémentaires



Warning Potential Radio Frequency (RF) hazard. Where you see this alert symbol and WARNING heading, strictly follow the warning instructions to avoid injury to eyes or other personal injury.

Avertissement Danger possible de Fréquence Radio (RF). A la vue de ce symbole d'alerte et du terme AVERTISSEMENT, suivez rigoureusement les instructions d'avertissement afin d'éviter une blessure aux yeux ou toute autre blessure.



Warning Where you see this alert symbol and WARNING heading, strictly follow the warning instructions to avoid personal injury.

Avertissement A la vue de ce symbole d'alerte et du terme AVERTISSEMENT, suivez rigoureusement les instructions d'avertissement pour éviter toute blessure.



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**Danger** Electric shock hazard: Where you see this alert symbol and DANGER heading, strictly follow the warning instructions to avoid electric shock injury or death.

Danger Risque de choc électrique: A la vue de ce symbole d'alerte et du terme DANGER, suivez rigoureusement les instructions d'avertissement pour éviter tout choc électrique ou blessure mortelle.

# Warnings for Satellite Terminal / Avertissements pour le Terminal Satellite



#### Do not stand in front of the ODU (Antenna)

This device emits radio frequency energy. To avoid injury, do not place head or other body parts in front of the satellite ODU when system is operational. Maintain a distance of 1 m or more from the front of the Satellite Terminal ODU.

Ne pas se tenir en face de l'ODU (antenne) Cet appareil émet une énergie de fréquence radio. Pour éviter toute blessure, ne placez pas la tête ou toute autre partie du corps en face de l'ODU satellite lorsque le système est opérationnel. Maintenez une distance de 1 m ou plus par rapport à l'ODU du terminal satellite.



**General** Handle your Satellite Terminal with care. Avoid exposing your Satellite Terminal to extreme hot or cold temperatures outside the range -40°C to +75°C.

Avoid placing the Terminal close to cigarettes, open flames or any source of heat.

Changes or modifications to the Terminal not expressly approved by Hughes Network Systems will void the Warranty and could void your authority to operate this equipment.

Only use a soft damp cloth to clean the Terminal.





To avoid impaired Terminal performance, please ensure the unit's ODU is not damaged or covered with foreign material like paint or labeling.

When inserting the SIM, do not bend it or damage the contacts in any way. When connecting the interface cables, do not use excessive force.

Général Manipulez votre terminal satellite avec soin. Évitez d'exposer votre terminal satellite à des températures extrêmement chaudes ou froides en dehors de la plage -40  $^{\circ}$  C à 75  $^{\circ}$  C.

Évitez de placer le terminal à proximité de la cigarette, de flammes nues ou de toute source de chaleur.

Les changements ou modifications apportées au Terminal et non expressément approuvées par Hughes Network Systems annulent la garantie et peuvent annuler votre droit à utiliser cet équipement.

Utilisez uniquement un chiffon doux humide pour nettoyer le terminal.

Pour éviter toute dégradation des performances du terminal, veuillez vous assurer que l'ODU de l'unité n'est pas endommagée ou recouverte d'un corps étranger, comme de la peinture ou de l'étiquetage.

Lorsque vous insérez la carte SIM, ne pas la plier ni endommager les contacts en aucune manière. Ne pas forcer lors de la connexion des câbles d'interface.



In the vicinity of blasting work and in explosive environments Never use the Satellite Terminal where blasting work is in progress. Observe all restrictions and follow any regulations or rules. Areas with a potentially explosive environment are often, but not always, clearly marked.

A proximité de travaux de dynamitage et d'environnements explosifs N'utilisez jamais le terminal satellite près de travaux de dynamitage en cours. Respectez toutes les





restrictions et suivez toutes les instructions ou la règlementation. Les zones présentant une atmosphère potentiellement explosive sont généralement, mais pas toujours, clairement signalées.



**Qualified Service** Do not attempt to disassemble your Satellite Terminal. The unit does not contain consumer-serviceable components. Only qualified service personnel may install or repair equipment.

Service Qualifié N'essayez pas de démonter votre terminal satellite. L'unité ne contient pas de composants réparables par le consommateur. Seul le personnel qualifié peut installer ou réparer le matériel.



**Accessories** Use Hughes approved accessories only. Use of non-approved accessories may result in loss of performance, damage to the Satellite Terminal, fire, electric shock or injury.

Accessoires Utilisez uniquement des accessoires approuvés par Hughes. L'utilisation d'accessoires non approuvés peut entraîner une dégradation de performance, un endommagement du terminal satellite, un incendie, une électrocution ou des blessures.



Connecting Devices Never connect incompatible devices to the Satellite Terminal. When connecting the Satellite Terminal to any other device, read the device's User Manual for detailed safety instructions.

Connexion de périphériques Ne jamais connecter des périphériques incompatibles au terminal satellite. Lors du raccordement du terminal satellite à un autre appareil, lire le manuel utilisateur du périphérique pour les instructions détaillées de sécurité.







Pacemakers The various brands and models of cardiac pacemakers available exhibit a wide range of immunity levels to radio signals. Therefore, people who wear a cardiac pacemaker and who want to use a Satellite Terminal should seek the advice of their cardiologist. If, as a pacemaker user, you are still concerned about interaction with the Satellite Terminal, we suggest you follow these guidelines:

- Maintain a distance of one meter from the front and sides of the ODU and your pacemaker;
- Refer to your pacemaker product literature for information on your particular device.

If you have any reason to suspect that interference is taking place, turn off your Satellite Terminal immediately.

Stimulateurs Cardiaques Les différentes marques et modèles de stimulateurs cardiaques disponibles présentent un large éventail de niveaux d'immunité aux signaux radio. Par conséquent, les personnes qui portent un stimulateur cardiaque et qui veulent utiliser un terminal satellite doivent demander l'avis de leur cardiologue. Si, en tant qu'utilisateur de stimulateur cardiaque, vous êtes toujours soucieux d'une éventuelle interaction avec le terminal satellite, nous vous suggérons de suivre ces directives:

- Maintenez un mètre de distance entre votre stimulateur cardiaque et l'avant ou les côtés de l'ODU;
- Reportez-vous à la documentation de votre stimulateur cardiaque pour toute information spécifique à celui-ci.

Si vous avez un doute que des interférences se produisent, éteignez votre terminal satellite immédiatement.



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Hearing Aids Most new models of hearing aids are immune to radio frequency interference from Satellite Terminals that are more than 2 meters away. Many types of older hearing aids may be susceptible to interference, making it very difficult to use them near a Terminal. Should interference be experienced, maintain additional separation between you and the Satellite Terminal.

Appareils Auditifs La plupart des nouveaux appareils auditifs sont insensibles aux interférences dues aux fréquences radio des terminaux satellites situés à plus de 2 m . De nombreux modèles plus anciens peuvent être sensibles aux interférences, ce qui les rend très difficiles à utiliser à proximité d'un terminal. En cas d'interférences détectées, veuillez maintenir une distance supplémentaire entre vous et le terminal.



**Electrical Storms** installation of the Satellite Terminal during electrical storms may result in severe personal injury or death.

Orages Electriques L'installation d'un terminal satellite pendant un orage électrique peut entrainer des blessures graves ou mortelles.



**Protective Earth Grounding** is recommended by Hughes for both the IDU and the ODU equipment. Please consult professional local advice for these requirements.

Une mise à la terre de protection est recommandée par Hughes à la fois pour l'IDU et le matériel ODU. Veuillez consulter un conseil professionnel local pour ces spécifications.



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# **Chapter 1**

# **Product Description**

# **Contents of the Hughes** 9502 Kit

The Hughes 9502 Kit (P/N 3500509-0001) is a two piece design that comes with an Indoor Unit (IDU), an Outdoor Unit (ODU) and a 10 meter RF cable with N to TNC adapter.



Figure 1 – IDU P/N 3500563-0001



Figure 2 – RF Cable with N to TNC adapter P/N 3500634-0001



Figure 3 – ODU P/N 3500564-0001





# Optional Mounting Accessories

The IDU can be mounted using the IDU strap (P/N 3500617-0001) if desired. The ODU can be mounted using the Basic Fixed Mount Kit (P/N 3004066-0002) or by using the azimuth elevation bracket (P/N 1022994-0022) and an existing 1.5" diameter pole.

#### Main features of the 9502

The main features of the Hughes 9502 terminal are listed below:

- Use of Internet Protocol (IP) via the BGAN satellite network
- Remote Management
  - Web UI interface
  - SMS Control
  - o AT Command Control
  - o Log file upload
  - o Terminal configuration
  - o Remote firmware upgrade
- Power Savings and Sleep Mode
- IP Watchdog
- Install Mode
- XL-band ready
- Relay Mode





- Auto Power ON when power is applied
- Automatic PDP Context Activation (Static or DHCP)
- Dedicated M2M webUI
- Security
  - Ethernet MAC Filtering
  - Administration Password
  - SMS Control password
  - White List for SMS control
  - AT Command password lock
  - SIM Personalization
    - Phone-to-SIM
    - DP SIM Lock
    - SP SIM Lock

#### Interfaces

The Hughes 9502 has the following interfaces:

- Ethernet connection (RJ45)
- USB 1.1 connection (USB Type-B) for PC to configure terminal
- TNC type RF connector on IDU and N-type RF connector on the ODU
- Integrated GPS receiver and L-band ODU
- RS232 serial interface (DB9 male, DTE) to external NMEA 0183 based GNSS device (e.g., GLONASS receiver). This port cannot be used for serial data.
- 3 LED status display and a single function button
- 3.5 mm stereo audio jack for audio tone or voltage level to assist in ODU pointing
- USIM card slot behind SIM door







Figure 4 – Front side view of IDU



Figure 5 – Back side view of IDU





### **Terminal Specifications**

Technical Considerations		
hnical Specifications		
@ 1626.5 – 1675MHz		
@ 1518 – 1559 MHz		
@ 1574.42 – 1576.42 MHz		
1.12 Kg		
150 mm x 200 mm x 45 mm		
1.85 Kg (exclude mount and cable)		
385 mm x 385 mm x 33 mm		
-40°C to +75°C		
-55°C to +75°C		
95% RH at +40°C		
Survival wind loading (with optional mount) up to 100 mph		
IP-40 Compliant		
IP-65 Compliant		
+12VDC / +24VDC		
RJ45 connector (Ethernet 10BaseT)		
USB –Type B (USB 1.1 for configuration PC)		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
Single external BGAN Satellite and GPS antenna connection		
GPS module inside Indoor Unit		
3 status LEDs		
Antenna pointing audio tone and voltage level indicator		
through audio jack		
SIM/USIM Slot (behind SIM door)		

Table 1 – Terminal Specifications





### **Chapter 2**

### **Configuration via Web UI**

The UT is typically configured via the Web User Interface (UI).

#### **Web UI Layout**

The Web User Interface (UI) can be accessed from a PC browser by entering 192.168.128.100 as the URL (unless you change the IP address of the UT.) The Web UI can be used with IE8 or 9, Mozilla or Safari.

Table 2 shows the 9502 Web UI layout:



Home	Connections	Settings	M2M	Security	SMS
Home	Manage Contexts	IP Address/DHCP Settings	M2M Setup	Security	Send/Receive SMS
	Manage APNs	Ethernet Port			Saved Drafts
		ATC			Sent Messages

Table 2 – 9502 WebUI Layout

#### **Home Tab**

The home page includes the following fields:

#### **Terminal Information**

- Model
- IMEI
- Software Version

#### SIM Information

- IMSI
- SIM APN
- Terminal phone number





#### Troubleshooting

- System Log
- Event Log
- Packet Log

These files can be FTP'd out of the UT and used for debugging. To download the logs right-click on the "Download Current" link and select "Save Target As".



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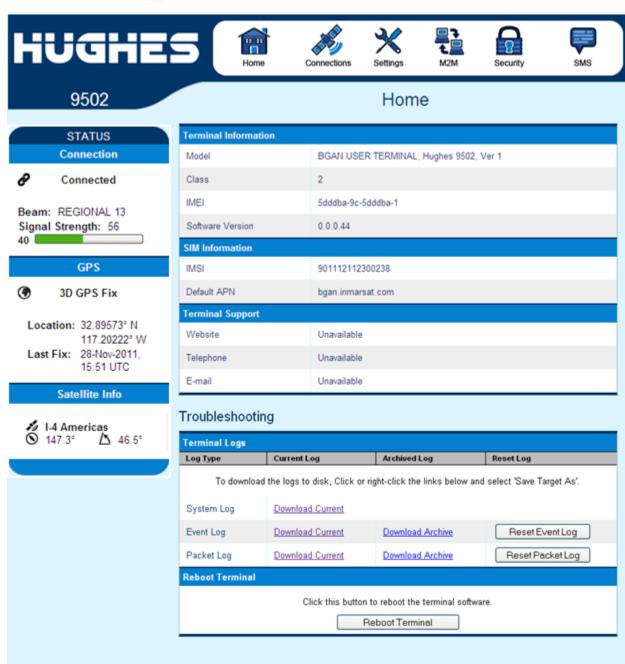


Figure 6 - Home Page



#### **STATUS**

#### Connection



Connected

Beam: REGIONAL 13 Signal Strength: 56

#### **GPS**



3D GPS Fix

Location: 32.89573° N

117.20222° W

Last Fix: 28-Nov-2011,

15:51 UTC

#### Satellite Info



I-4 Americas 147.3° ▲ 46.5°

#### **Status Bar**

The status bar is included on the home page and other pages that do not have a navigation bar. It includes a field with the elevation angle and compass direction towards the visible satellite(s).

The status text in the *Connection* section is as shown in Table 3 – Status Bar below.

Display	Comments	Corresponding LED display
Initializing	Initial start up (~15-20 secs)	Various
Pointing	UT in pointing mode	All three LEDs flash 1Hz
Registering	Attempting to register - pointing mode exited or bypassed	PWR on, GPS on or flashing, NET off
Registered	Registered and attached, no context	PWR on, GPS on and NET flashing
Connected	PDP context active	All three on (or off after 1 minute timeout)

Table 3 – Status Bar

The signal strength bar shows the quality of the received signal. The same scale is used for all beam types and so during pointing only the left part of the bar is used. The signal strength in the Global Beam should be 46 to 52dB when it is pointed correctly (the higher the better).

The signal strength increases in value as you transition to the Regional Beam and again when you get a PDP context and transition to the Narrow Beam.

The GPS status area shows the status of the GPS fix and results are shown in the following table:

Display	Comments
Acquiring	Trying to acquire a GPS fix
Stored	UT is using a Stored GPS fix
2D GPS Fix	The UT has acquired a @D
	GPS fix and can continue
	Registration with the network
3D GPS Fix	The UT has acquired a 3D Fix
Location	Shows Latitude and Longitude
	coordinates if allowed by
	network GPS Policy
Last Fix	Shows date and UTC time of
	last GPS fix

Table 4 - GPS Status

The Satellite Info section shows the satellite that the UT should be pointed to and gives the Azimuth and elevation angles to the satellite. When the UT is in an overlap region, the Satellite Info section will show both satellites and the user will have to pick the best one to point to.





#### **Connections Tab**

#### Manage Contexts Page

The Manage Contexts page under the Connections tab displays the status of any active contexts and allows contexts to be controlled. Typically this page will not be used and you configure context activation via the always on option on the M2M page.



Figure 7 – Manage Contexts





#### Manage APNs Page

The Manage APNs page under the Connections tab allows the user to view the available APNs and define new ones, e.g. if the correct APN is not configured in the SIM.

To make an APN the default, select it in the Defined APNs list and press "Make Default". The selected APN will be moved to the top of the list and shown in bold font. If an Always on Context is already defined, you must manually update the configuration on the M2M page to change to the new APN.



Figure 8 – Manage APNs





#### **Settings Tab**

The settings tab has the following configuration pages:

#### IP Address/DHCP Settings

The IP settings page under the Settings tab includes the following fields:

- Terminal Local IP address
- DHCP Server enable
- DHCP Address Range
- Lease Time when Idle
- Lease Time when Connected
- Network Mode field: NAT or Relay (see Network Mode section.)

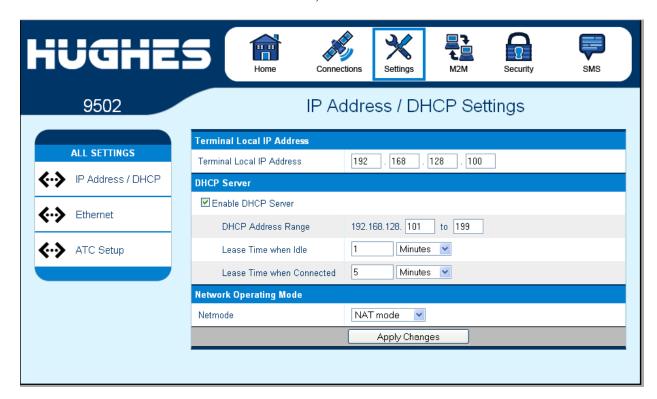


Figure 9 – IP Address/DHCP Settings





#### Ethernet Port Page

The Ethernet Port settings page includes:

- Wake On LAN (see Wake on LAN (Any Packet section):
  - Wake On LAN On/Off radio button
  - Wake On LAN idle timer in minutes
  - Wake On LAN time of day 24 hour clock
- MAC Address filtering:
  - o Ethernet MAC Address filtering enable tick box
  - o Table of allowed Ethernet MAC addresses.

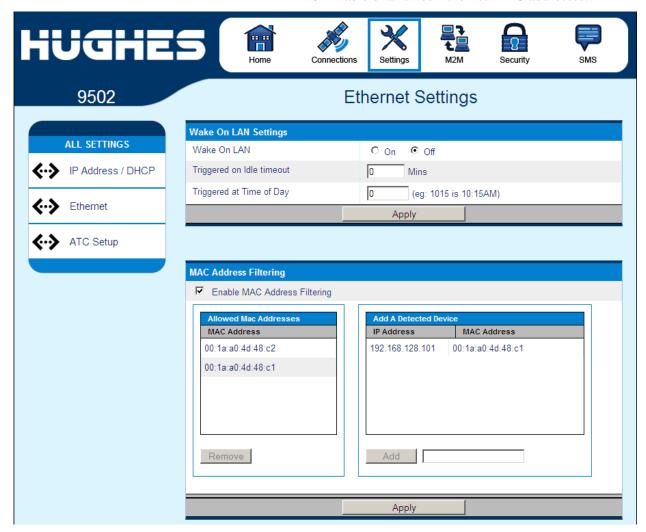


Figure 10 – Ethernet Settings





#### ATC Page

The ATC page includes:

- ATC robustness On/Off radio button
- ATC scan button
- ATC scan status bar. This indicates the results of the last scan.

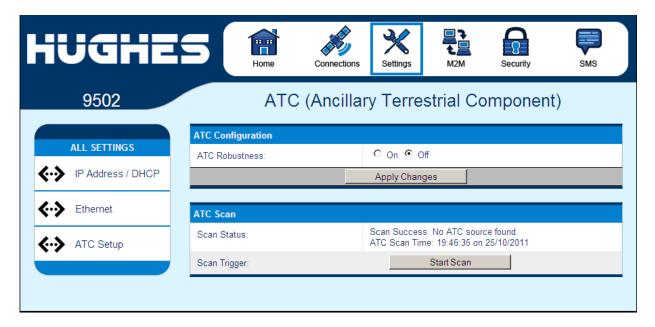


Figure 11 – ATC Page

#### M2M Page

The M2M page (see Figure 12 - M2M Setup) includes the following configurable parameters:

#### **Ping Configuration:**

- Context Watchdog On/Off
- Primary Ping Address
- Secondary Ping Address
- Tertiary Ping Address
- Time between Pings
- Ping required Yes/No If not set, then the system will not try to ping on timer expiration if data was transmitted within the watchdog period.





#### Always On Context:

- Always on context On/Off (default is on)
- Always on static IP address. If the TE has a known static IP address or never ARPs, enter this address. Alternatively, leave the IP address blank (0.0.0.0) and the UT will set up a context for the first device it detects through ARP during startup.
- APN drop down box



Figure 12 – M2M Setup





#### **Security Passwords**

The security passwords page includes the following functions:

- Personalization Key to lock the UT to a particular USIM (SIM to Phone lock)
- Administration password off by default. Default password is *admin*
- SMS Remote Control off by default. On/Off radio button
- SMS Remote Password default is remote
- List of phone numbers allowed to send remote control SMS

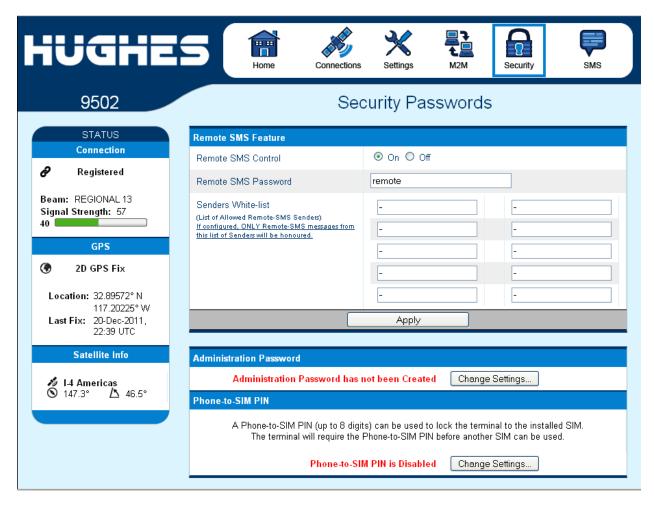


Figure 13 – Security Passwords





#### **SMS Pages**

The SMS pages are used to send SMS messages from the terminal to another BGAN device or another phone number.

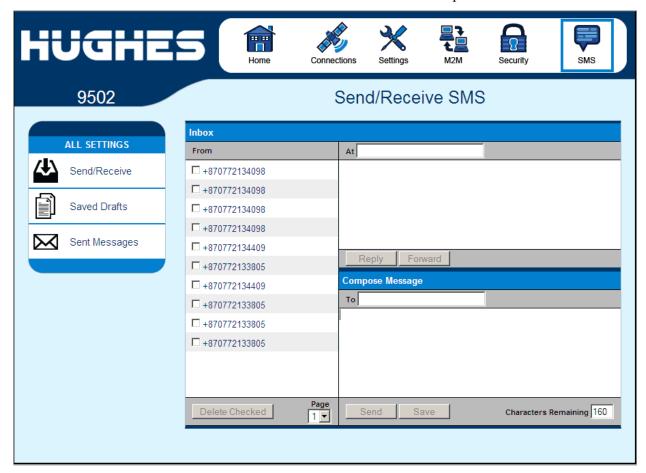


Figure 14 – SMS Send/Receive





# **Chapter 3** Operational Features

#### **Network Mode**

By default the 9502 is configured for NAT mode in the Network Mode field on the IP Address/DHCP settings page.

#### **Nat Mode**

In **NAT mode** once a PDP context is active, the UT will translate between the local and global IP addresses. This is a basic NAT that only performs IP address translation. It does not use port translation.

#### **Relay Mode**

In **Relay mode** the UT will supply the global IP address to the TE when the context is established. Relay mode is single user and only supports a single connected TE.

In Relay mode DHCP is required to provide the global IP address to the TE. When the context is activated, the DHCP server in the UT will NACK the next DHCP lease renewal from the TE and assign the global IP address assigned by the network. The local IP connection will be torn down and reestablished as the IP address changes. Similarly, when the context is deactivated the DHCP server will NACK the lease renewal and then reassigns the original private IP address.

The Web UI will lose and reestablish its connection to the terminal as the IP address is changed.

To make the IP address change happen quickly a short DHCP lease should be used. The terminal defaults the lease time to 60 seconds in idle and connected mode.

#### NOTICE

Relay mode only supports a *single* user TE.





#### **Remote Control**

The 9502 can be controlled remotely via SMS and locally via AT commands. The AT interface can be used for remote control if AT commands can be sent by smart terminal equipment (TE) that is controlled via the IP pipe over the PDP context. The syntax of the AT commands is covered in the "Inmarsat BGAN UT-TE Interface Specification".

The 9502 includes a remote control by SMS feature that supports the special SMS messages listed in Table 5 – Remote Control SMS Message Commands. Remote control SMS is supported by default in the 9502 and does not have to be activated by a feature code. The syntax of the messages is covered in the "Hughes 9502 SMS Remote Control User Guide."

All remote control messages and responses must fit in a single 140 character SMS.

The SMS handler automatically deletes any message that fills the last SMS slot in the USIM to ensure there is always room to receive control SMS messages. Control messages are received into the SIM then read out and deleted so a free slot is required.

Command	Action	
ACTIVATE	Activate PDP context	
DEACTIVATE	Deactivate PDP context	
CLEAR	Clear SMS messages in the UT SIM	
GETINFO	Get info from the UT. This returns an SMS with the following information:	
RESTART	Restart the UT	
WATCHDOG	Change the configuration of the watchdog parameters	
ATCO	Execute the AT command encapsulated in the SMS. This can be used for the following new remote control functions:  Download Firmware  Start Firmware upgrade  Get file  Send file, e.g. log files.  Activate Remote Web access	
	<ul> <li>Perform ATC scan and/or set ATC robustness.</li> </ul>	

Table 5 – Remote Control SMS Message Commands





# Remote Upgrade and File Transfer

The 9502 includes an FTP client. The operator can send SMS messages or AT commands to command the 9502 to send or retrieve files from an FTP server in the network or Internet. This allows the 9502 to be upgraded, reconfigured and also allows log files to be sent back to the server. The FTP server can be in the Inmarsat network, e.g. accessible via a free APN for upgrades; or can be outside the Inmarsat network, e.g. accessible via a normal APN for debugging and configuration changes.

The remote upgrade process uses download firmware and firmware upgrade commands.

#### **Security**

The Web UI includes an admin feature that can be activated from the security page to prevent unauthorized access to the Web UI. Additionally the AT command port is locked by default and the command:  $AT\_ICLCK="AD",0,"<admin password>"$  must be used to unlock it before AT commands can be used. Both mechanisms use the same password but the AT commands port and each Web UI session use a separate lock and must be individually unlocked.

Support for SMS Remote control is configured from the SMS settings page. Each Remote Control SMS must include the correct password. Remote control SMS containing AT commands will be processed regardless of the Admin setting (they require the feature to be active and the correct SMS password.)

USIM personalization (or "Phone to SIM lock") can be used to lock the UT to a particular SIM.

MAC address filtering on the Ethernet port page allows the user to define the MAC address of TEs authorized to communicate via the Ethernet port. **Note:** The USB port is not included in the MAC filtering and can be used if the proper USB driver is installed on the TE.

#### Wake on LAN (Any Packet)

The UT includes a special low power mode called Wake on LAN (any packet). From the Web UI you can configure the UT to power down into this mode after a configurable idle timer or time of day.

Wake on LAN operation is configured from the Ethernet Settings page (Figure 10 – Ethernet Settings) under the Settings tab. It





includes a configurable idle timer to control when the UT shuts down into the Wake on LAN mode. The UT declares the link idle if no packets are received on the Ethernet port within the idle time.

Additionally, the UT can be configured to power down at a configurable time of day. Enter UTC time as 0001 to 2400. Set to 0 to deactivate the time of day feature.

When the UT powers down into this mode it will disconnect from the BGAN network and monitor the local Ethernet port and power up again if it sees any Ethernet packet (ARP, DHCP, data packet, etc). In this mode the power consumption is less than 10mW when powered from a 12V source. The UT generates Ethernet sync pulses so the TE believes the link is still active.

When an Ethernet packet is detected the UT will power up normally, register and bring up a PDP context (if configured for ACA.) It takes about 1 minute for the UT to be fully connected to the Inmarsat network.

For this mode to be useful the TE must only send Ethernet packets when it has data to send over the air. Thus, for example, the TE should be configured with a static IP address to avoid periodic DHCP exchanges for waking up the UT.

#### **Serial Pin Power Control**

The UT can be switched off by applying a voltage to pin 9 of the DB9 serial port.

If you apply voltage to Pin 9 of the serial port with pin 5 as Ground, the UT will power down. It will power up when you remove the voltage.

The voltage can be 2.5V to 50V. 12V is the recommended level.

#### **ATC**

The UT includes an extended L-band scanning mode to detect Auxiliary Terrestrial Component (ATC) or other sources of external interference. The terminal can be commanded into scanning mode by the Web UI, AT command or SMS command. During the scan the terminal will be offline to the BGAN network and will automatically reboot to return to normal operation.

In scanning mode the terminal measures the received signal strength across the 34MHz of L-band spectrum (1518 to 1559MHz). Once the scan is complete the UT restarts and communicates the results of the scan.





If an interference signature is detected, an attenuator is switched into the receiver path to attempt make the UT more resilient to ATC interference.

The attenuator setting can be controlled from the Web UI, AT command or remote SMS.

#### Watchdog

The M2M terminal includes a watchdog mechanism that can be used to periodically verify the UT network connectivity and take action if a problem is detected.

Configuration Parameters are shown in the M2M Page section Page 28.

#### **GNSS**

The Hughes 9502 terminal supports a **Global Navigation Satellite System** (GNSS) feature. During start up, if the UT detects a GNSS device connected to the GNSS serial port, it will attempt to obtain a position fix from the GNSS device via NMEA messages.

The serial port is a DB9 male, configured as a DTE and supports autobaud between the valid NMEA rates 4800bps and 38.4kbps. The GNSS device must provide a fix via the RMC or GGA NMEA messages. Typically a straight through DB9 serial cable can be used with the correct plug for the GNSS device.





## Chapter 4

### **Installation Instructions**

#### Inspecting the parts

Make sure you have all parts listed in the shipment box before beginning the installation; you should have the following parts:

- 1. Hughes 9502 IDU
- 2. Flat panel ODU
- 3. 10m coaxial cable terminating in N(M) and TNC(M) connectors

#### **Optional installation items:**

- 1. Basic Fix Mount Kit (P/N 3004066-0002)
- 2. Azimuth elevation bracket (P/N 1022994-0022)
- 3. IDU Strap (P/N 3500617-0001)

## Determining where to install the ODU

In order for your terminal to work correctly, it must be installed in a location that provides a clear, unobstructed, line of sight between the ODU and the satellite. Any objects such as building structures or trees may degrade the quality of the satellite signal. To determine where to install the ODU, you need to determine that you have both a clear unobstructed line of sight to the satellite and that your fixed mount is aimed in the approximate direction to the satellite.

To determine the direction from your location to the satellite follow the steps below:

- Determine the latitude and longitude of the site and enter them into the Location Spreadsheet that has been provided. This will give you the compass direction and the elevation angle to point the ODU. Alternatively, it can be done by powering up the UT, allowing it to get a GPS fix and then checking the pointing information on the web UI Home page.
- 2. Unbox the Hughes 9502 and remove the ODU and cable assembly.





- 3. Determine the location of both the IDU and ODU before starting to make sure that the IDU and ODU can be installed within the 10M cable length.
- 4. Install the ODU with the installation hardware that you have chosen by following the instructions that follow.

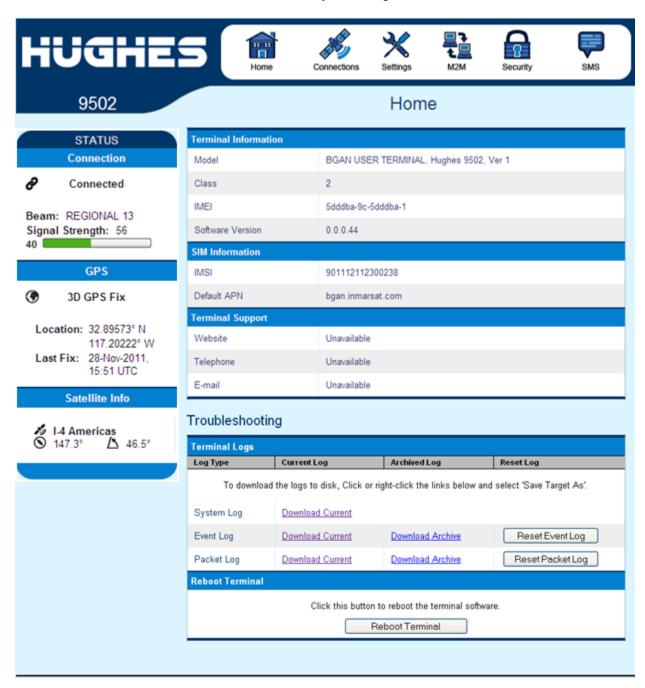


Figure 15 – Home Page showing pointing information





# ODU installation using the basic fix mount kit; (P/N 3004066-0002)

### **A** CAUTION

You may install the fixed mount on any structurally sound surface; either on a horizontal, or vertical, or a sloped surface such as a roof or wall.

The pole is shipped attached to the base bracket. Mount the base bracket of this assembly to the structure with the appropriate hardware (not included). Consult local building codes if needed. Once the base bracket is mounted, perform the following steps (refer to Figure 16 – Base Bracket and bubble level and Figure 17 – Pole Assembly):

- 1. Insert the bubble level into the end of the pole (pipe) opposite the base bracket. The bubble level fits inside the pole.
- 2. Loosen the pole attachment fasteners at the base bracket so the pole can swivel.
- 3. Swivel the pole until the end of the pole where the ODU will be installed is vertical. Adjust the pipe position until the bubble is centered inside the circles on the top surface of the bubble level.
- 4. Tighten the pole attachment fasteners on the base bracket.





Figure 16 – Base Bracket and bubble level



## **HUGHES**



Figure 17 – Pole Assembly

# Mounting the azimuth elevation bracket

Mount the azimuth elevation bracket to the back of the ODU using four washers/nuts (see Figure 18 – Azimuth elevation bracket). The N-type RF connector should be on the left or right side of the azimuth elevation bracket if installed correctly.



Figure 18 – Azimuth elevation bracket





# Mounting the azimuth elevation bracket onto the pole

- 1. Slide the pole collar of the azimuth elevation bracket over the end of the pole (see Figure 19 Pole Collar).
- 2. Leave the pole collar bolts loose to allow for azimuth adjustment during pointing.



Figure 19 – Pole Collar

#### **NOTICE**

#### **Important Notes:**

- The RF cable assembly supplied (10m), forms an integral part of the ODU system and is made to a specific length in order to meet the system specifications. The cable must not be cut to a shorter length, nor must any cables be added to the cable run.
- It is essential that only the supplied cable is used. Third party cables may not be used; their use will invalidate the warranty of the ODU and may cause system malfunction.
- It is important not to stress the connection to the ODU during installation of the coaxial ODU cable.
- The minimum bend radius of the cable is 2" (50mm) however; it is recommended that a 4" (100mm) bend radius be used.
- Any modification to these rules must be approved by Hughes and Inmarsat prior to the installation.





### Attaching RF cable to ODU

- 1. Attach the cable to the mounting pole via a zip strap to take the weight of the cable.
- 2. Mate the connector to the ODU firmly by hand but do not over tighten.
- 3. Weatherproof the connection using self-amalgamating tape (not provided) (see Figure 20 Weather proof connector).
- 4. Route the cable to the 9502 IDU avoiding any sharp bends, extremes in temperature, and compression of the cable.



Figure 20 – Weather proof connector





# Attaching RF cable to the Hughes 9502 IDU



Locate the TNC connector on the back of the ODU and connect the cable from the ODU to the IDU (see Figure 21 – Connect cable to TNC connector on IDU using N to TNC adapter provided)



Figure 21 – Connect cable to TNC connector on IDU





## Connecting power leads to the Hughes 9502 IDU





Once the ODU is properly connected, you can then connect the power leads (positive + and negative -) from the power source to the 9502 IDU power connector. The IDU is clearly marked for positive and negative leads and the IDU is designed for a nominal 12Vdc and 24Vdc voltage and is protected from reverse polarity.

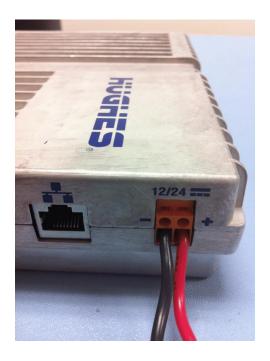


Figure 22 - Power connector





Insert the positive lead into the positive terminal jack and tighten the screw. Then connect the negative lead into the negative terminal jack and tighten the screw (see Figure 23 - Connecting power leads).

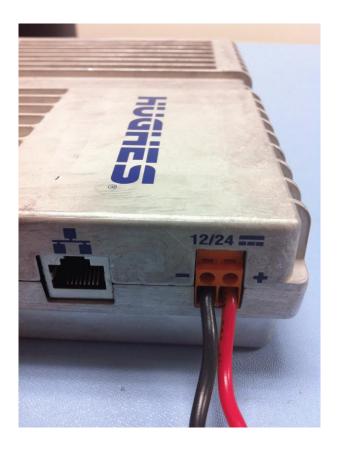


Figure 23 - Connecting power leads

**NOTICE** 

#### **Important Note:**

- Ensure the power source is turned off before connecting the power leads to the 9502 IDU
- Ensure that the screws are tightened to where the power leads cannot fall out





## Powering up the Hughes 9502





The 9502 will power up automatically when DC power is applied. It does not have a power button. By default it will bypass antenna (ODU) pointing and automatically register, attach and activate a PDP context.

Once you have applied DC power, the terminal goes through a power-on-self-test (POST) that takes approximately 15-20 seconds and then the power LED will start flashing for another 15 seconds. If you want to enter pointing mode, you will need to short press (<2 seconds) the function button within those 15 seconds. If you do not short press the Function button, the unit will start to register with the network and set up a PDP context.





If the unit bypasses ODU pointing and starts to register with the network, the ODU is now transmitting so please stay at least 1 m clear of the front of the ODU to avoid RF radiation.



Figure 24 - Function Button





#### **Pointing the ODU**



Determine the azimuth and elevation for the look angle to the satellite in advance of the installation by using the approximate latitude and longitude of the site in a simple satellite pointing application or specially marked map. This is the preferred mode as it simplifies the install and may be critical data for choosing the site if there are multiple potential locations to mount the UT in wooded, mountainous or built-up areas.

Alternatively, you can get the azimuth and elevation angle by powering up the UT, allowing it to get a GPS fix and then checking the pointing information on the 9502 home webUI page.

In order to speed up getting the initial GPS fix, while you are in pointing mode you should lay the ODU flat with a clear view of the sky first so that it can see as many GPS satellites as quickly as possible. Once you get the initial GPS fix (GPS LED solid green), then you can point the ODU to the Inmarsat satellite.

If you short press the function button to enter pointing mode, all three LEDs starts to blink, indicating that the terminal is in pointing mode.

To aid in pointing, you can use two different methods:

- 1. You can use the 3.5mm jack to connect stereo speakers or a headset in order to hear the tones for pointing. As the signal strength increases, the tone pitch will get higher and faster
- 2. You can also use the 3.5mm jack to connect a 3.5mm stereo plug that has two bare wires exposed. Touching the two exposed wires with voltmeter leads you can see the voltage readings from 2.5V to 3.2V as you are pointing. The higher the voltage the better the ODU is pointed. A voltage reading of approximately 2.9V equates to a good signal level of 50dB.

You can also monitor the signal strength by hooking up a laptop/PC to the USB port and monitor it from the webUI (see Figure 25). Access the webUI by opening a browser (Mozilla, Safari or IE8 or 9) and typing in the local IP address of the terminal 192.168.128.100





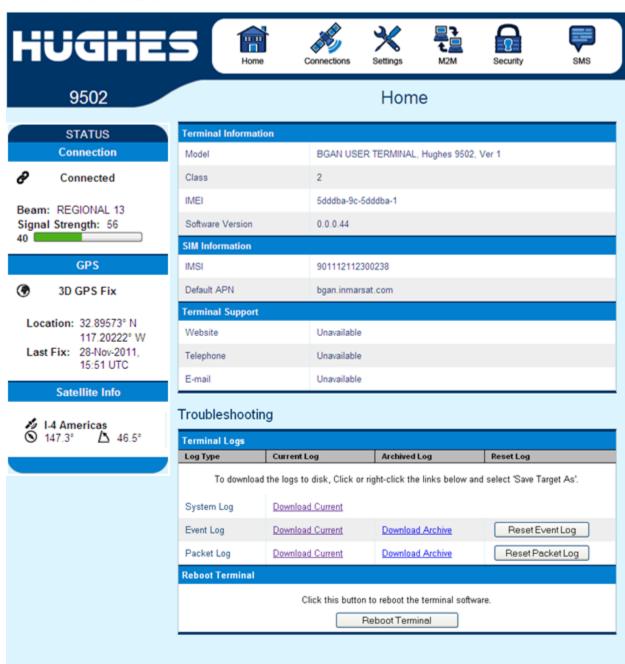


Figure 25 – Signal Strength on Home Page





#### **LED Flow Chart**

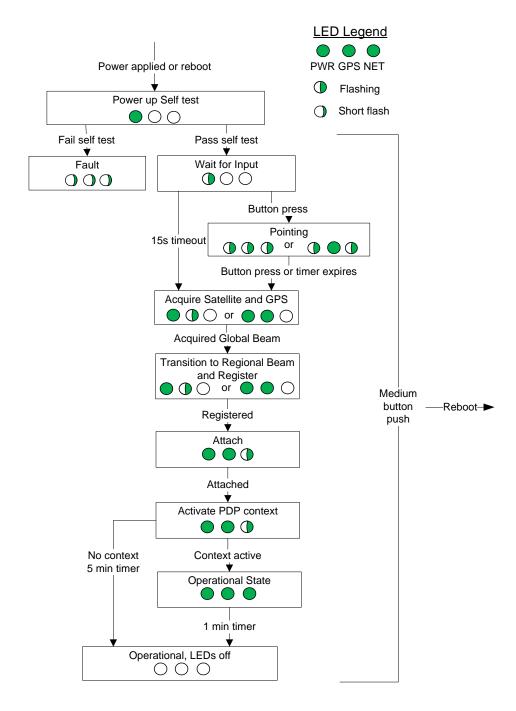


Figure 26 – LED Flow Chart





#### NOTICE

#### **Important Notes:**

- To aid in pointing the ODU, there is a 3.5mm stereo audio jack port on the IDU. The user can insert a stereo headset to hear audio tones or use a voltmeter to measure the voltage which indicates the quality of the signal detected during install mode.
- The IDU must have DC power applied for pointing.
- The GPS antenna is an integral part of the ODU and a GPS fix can be obtained as part of the pointing process.



• Once you are out of pointing mode, you need to stay away from the front and sides of the ODU at least 1m for safety purposes.





## Adjusting the azimuth and elevation of the ODU



To adjust elevation, refer to Figure 27 - Adjusting elevation

- 1. Loosen the two bolts in the curved slots on the azimuth elevation bracket.
- 2. Read the elevation angle from the elevation scale on the bracket, using the red edge on the pole collar as the angle indicator. View this edge through the curved slot on the azimuth elevation bracket.
- 3. Pivot the ODU to obtain the desired elevation.



Figure 27 - Adjusting elevation



Figure 28 - Adjusting azimuth





To adjust azimuth, refer to Figure 28 - Adjusting azimuth

- 4. Loosen the two bolts on the pole collar.
- 5. Move the ODU to either side, in small increments, as necessary to get the optimum signal strength as shown on the voltmeter or by the fast high pitch sounds that you hear with the headphones.

When you have maximized the signal quality:

- 6. Tighten the two bolts in the curved slots on the azimuth elevation bracket to lock down the elevation adjustment.
- 7. Be careful not to change the ODU's orientation while tightening the bolts.
- 8. Tighten the two bolts on the pole collar to lock down the azimuth adjustment.
- 9. Make sure all other fasteners on both brackets are tight.





#### **Exit Pointing Mode**

- 1. Short press the function button (<2 seconds) to exit pointing mode. The terminal will initiate registration with the network.
- 2. Verify the unit registers, attaches, and establishes a PDP context by checking the status on the web UI or when all three of the LEDs are solid green (Figure 26 LED Flow Chart).
- 3. Optionally, verify the unit will correctly recover from a power cycle by removing and reapplying power. Verify it registers, attaches, and establishes a PDP context by again checking the status on the web UI or when all three of the LEDs are solid green (Figure 26 LED Flow Chart).
- 4. Verify end to end connectivity of the system, by sending a small amount of data from the device connected to the 9502 and verifying that the data was received by the other end (e.g., data center).





## Chapter 5

# Lightning Protection and Safety

Lightning and Grounding Precautions / La foudre et la terre Précautions





A lightning strike on the ODU, mounting hardware or cable may cause death or serious injury and is likely to damage both the ODU and the IDU.

La foudre sur l'ODU, le matériel de montage ou les câbles peut causer des blessures graves ou mortelles et est susceptible d'endommager à la fois l'ODU et l'IDU.

It is therefore essential that the installer does not use an installation location, which is likely to experience a lightning strike, and make suitable grounding and lightning protection arrangements to minimize any possibility of injury or damage. Professional local advice should be sought with respect to these matters. Hughes accepts no liability for any injury or damage caused by lightning strikes.

Il est donc essentiel que l'installateur évite tout emplacement d'installation susceptible d'être frappé par la foudre, et de mettre en place un dispositif de mise à la terre et de protection contre la foudre adapté afin de minimiser tout risque de blessure ou de dommage. Un conseil professionnel local devrait être consulté à cet égard . Hughes n'accepte aucune responsabilité pour tout préjudice ou dommage causé par la foudre.

Hughes 9502 indoor unit (IDU) chassis shall be connected to earth ground. Connect the earth grounding wire with lug in between the ground screw and chassis. Tighten the ground screw after the wire lug is installed. The wire lug material shall be either tin-plated copper or tin-plated steel.

Le châssis de l'unité d'intérieur Hughes 9502 (IDU) doit être connecté à la terre. Connectez le câble de mise à la terre avec une cosse entre la vis de terre et le châssis. Serrez la vis de terre après que le câble avec cosse ait été installé. Le câble avec cosse doit être soit en cuivre zingué ou en acier étamé.





Hughes also recommends that a protective earth cable be connected to the ODU or ODU mount. Please consult professional local advice for protective earth grounding requirements.

Hughes recommande également qu'un câble de terre de protection soit connecté à l'ODU ou au montage de l'ODU . Veuillez consulter un conseil professionnel local pour les spécificités concernant la mise à la terre de protection.

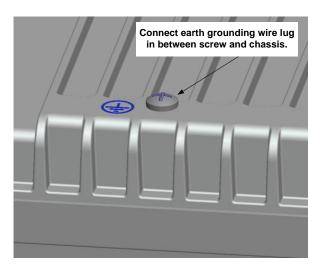


Figure 29 – 9502 IDU Protective Earth Grounding





#### **Disclaimer / Avertissement**

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Tout en étant rédigé de bonne foi, Hughes n'offre aucune garantie ou représentation quant à l'exactitude, l'exhaustivité ou l'adéquation quant à l'objectif de ce document ou son contenu, et toutes garanties, exprimées ou tacites sont exclues. Hughes, dans la mesure maximale permise par la loi, exclut toute responsabilité découlant de l'utilisation de ce document ou son contenu. L'attention des utilisateurs est attirée sur le fait que les lois et réglementations locales applicables à l'utilisation de l'ODU peuvent s'appliquer et il est de la responsabilité de l'utilisateur de les identifier et de s'y conformer.





## **Chapter 6**

# AT Unsolicited Response Codes

The following codes and text may appear as unsolicited response codes on the AT interface to the UT or in an SMS response to an ATCO Remote SMS command. Each code appears in the following format:

```
<crlf><at command>: <#>, <text><crlf>
```

#### Where:

<#> is the numeric response code
<text> is descriptive text about the response

#### Examples:

\_IGETFW: 20, FTP found no filename \_IUPDFW: 0, Complete

The message format is intended to be readable/usable by both automated processes and humans.

Table 6 below shows the current set of response codes, grouped by function.





Code	Text	Explanation
General	TEXT	Explanation
0	Complete	Operation completed
	Complete	successfully
1	Unexpected software	Software error
-	error	Software error
2	SWE message data error	Software error
3	Parameter error	Parameter error in the AT
		command. Not used because
		AT command handler will catch
		and display ERROR.
4	Local file open error	_IGETFW: could not open local
		file for download
		_IUPDFW: could not open
		control file for update
		parameters
		_UPDCFG: could not compute
		checksum for new config file.
5	Directory not found	Could not find specified
		directory on UT file system.
6	File not found	Could not find named file (on
		local file system).
7	Error renaming file	_IUPDFW: Could not restore
		'image.txt' after failed upgrade.
		_IUPDCFG: Could not rename
		new file to 'config.txt'.
	Management	
8	No entry in context table	No free entry in context ID
		table (all 11 contexts in use)
9	Context parameter error	Internal software error
10	Local IP addr error	Internal software error
11	Context activation error	Context activation failed. Could
		be problem with PS attach, SIM
		subscription, APN, network or
10		connectivity.
12	Context deactivation error	Context deactivation failed
	agement	
13	FTP hookup fail	Connection to FTP server
		failed. Problem could be server
		unreachable or specified IP
		address or server name invalid,
4.4	STD Lock City	or connectivity failure.
14	FTP login fail	FTP username or password
45	STD II I C. II	incorrect
15	FTP 'type' fail	Could not establish "binary"
4.6	570   116 11	mode.
16	FTP 'cwd' fail	Could not change to working





		1
17	FTP data connection fail	Could not establish an FTP data
		connection with the server.
18	FTP 'nlst' fail	Could not get list of files in
		current FTP server directory.
		Directory may be empty.
19	FTP xfer command fail	Could not initiate data transfer
		on an established connection.
20	FTP found no filename	Could not find a filename in the
		current server directory.
21	FTP local file read/write	Error while writing downloaded
	fail	file to UT flash or reading
		upload file data.
22	FTP socket fail	Error while reading or writing
		FTP data socket.
23	FTP completion error	Error while closing the current
	· ·	FTP connection.
24	FTP xfer timed out	FTP client timed out waiting for
		socket ready (read or write),
		e.g. due to loss of connectivity
		during transfer.
IGETF	·W	
25	File in use, cannot	The file to be downloaded is
	download	the same (by name) as the
		image currently in use.
26	Starting immediate	Normal success. File
	update	downloaded successfully, now
		starting immediate update.
IUPDF	W	otar ting immediate aparte.
27	New firmware file not	Could not find filename
	found	specified in upgraded control
	1.535	file.
28	New firmware file corrupt	Firmware file failed checksum
-5		test.
29	New firmware file failure	The new firmware failed to run
23	The wind of the failure	or failed to acquire the
		network and the unit fell back
		to the old release.
30	Upgrade admin file error	Problem with local file
	Sparade adminimine error	manipulation during upgrade
31	Upgrade status file error	process.  Problem with local file
21	Opgrave status file effor	
		manipulation during upgrade
ICETE		process
_IGETFI	1	File appoified in AT as we want
32	Can't overwrite protected	File specified in AT command
	file	was 'config.txt', 'config.chk',
		'config_bk.txt', 'config_bk.chk'





_IUPDCFG		
33	Can't use reserved file	Attempt to use one of
		protected config files as the
		new config.txt file.
_REMWE		
34	Invalid IP address string	An IP address parameter string
		could not be interpreted as a
		legitimate IP address.
35	Global IP: <ip_addr></ip_addr>	REMWEB connection set up
		successfully. Indicates global IP
		address assigned to the UT's
		own PDP context, to which an
		HTTP connection may be made.

<sup>\*</sup>Codes may change in future software release

Table 6 - AT Unsolicited Response Codes





### Chapter 7

### **Declaration of Conformity**

We,

**Hughes Network Systems** 

(manufacturer's name)

of

9605 Scranton Road, Suite 500, San Diego, CA 92121, USA

(address)

declare under our sole responsibility that the product

#### **Hughes 9502 Satellite Terminal**

(detailed description of product including name, type, model and supplementary information such as lot, batch or serial number, sources and number of items)

to which this declaration relates, is in conformity with the following standards and/or other normative documents.

For article 3.1(a), Health and Safety of the User:

EN 62311

IEC 60950-1 (2nd Edition)

For article 3.1(b), Electromagnetic Compatibility:

EN 301 489-1, EN 301 489-20

For article 3.2, Effective Use of the Spectrum Allocated:

EN 301 444

EN 300 328

We hereby declare that all essential radio test suites have been carried out and that the above named product is in conformity to all the essential requirements of Directive 1999/5/EC.

Identification mark:

The equipment will also carry the Class 2 equipment identifier:





The technical documentation relevant to the above equipment will be held at:

Hughes Network Systems, 9605 Scranton Road, Suite 500, San Diego, CA 92121, USA (name and address of EU representative)

**Bill Lindsay** 

War Lee lay

(name)

**Senior Engineering Program Director** 

(title)

23 January 2012



## **HUGHES**

#### **FCC Compliance**

This device conforms to the FCC rules. Any changes or modifications to Hughes Network Systems' equipment, not expressly approved by Hughes Network Systems, could void the user's authority to operate the equipment.

To comply with FCC RF exposure requirements, this device must be operated with a minimum separation distance of one meter from the front of the satellite terminal's antenna to a person's body. Other operating configurations should be avoided.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions; (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

# **EU RoHS (Restriction of Hazardous Substances) Directive**

The European Union (EU) Directive 2002/95/EC restricts the use of certain hazardous substances in electrical and electronic equipment.

Unless otherwise noted, all products, assemblies, and subassemblies manufactured by Hughes and its sub-contractors are compliant with this directive and any subsequent revisions or amendments.

# **EU WEEE (Waste Electrical and Electronic Equipment) Directives**

The European Union (EU) Directive 2002/96/EC on waste electrical and electronic equipment mandate recycling of electrical and electronic equipment throughout the EU by August 13, 2005.

Unless otherwise noted, all products, assemblies, and sub-assemblies manufactured by Hughes and its sub-contractors are compliant with this directive and any subsequent revisions or amendments. This product carries the WEEE label below to demonstrate compliance.

For addition information, contact Hughes Network Systems at: **www.hughes.com**.

